

West Lodge. It was chiefly from the foliage of the common bramble that I obtained it.

Mr. Barrett, who has kindly examined it, says that very likely this *may* be the var. *petrosana*; and indeed it agrees very well with Duponchel's figure of the latter on his sixty-fifth plate.

[To be continued.]

XXXVIII.—*Contributions to our Knowledge of the Spongida.*

By H. J. CARTER, F.R.S. &c.

[Plates XXVIII. & XXIX.]

[Continued from p. 304.]

Trachycladus levispirulifer, n. gen. et sp.
(Pl. XXVIII. figs. 1-5.)

Shrub-like, more or less compressed, stiff, consisting of a short irregularly round stem dividing at first dichotomously and then polychotomously into many branches, which terminate in digitations, more or less united laterally (Pl. XXVIII. fig. 1). Colour white on the surface, whitish yellow internally. Texture hard, dense. Surface reticulate, honeycomb-like, stiff, with small scopuliform processes along the lines of the reticulation, bearing a white incrustation composed of the flesh-spicules of the species. Internal structure of the stem and branches consisting of dense, compact, areolar sarcode, especially towards the centre, charged with the spicules of the species, expanding in lines from the axis of the branch upwards and outwards, so as to end in the little scopuliform processes mentioned. Spicules of three forms (viz. one skeleton- and two flesh-spicules):—1, skeleton-spicule, acerate, curved, smooth, pointed gradually, acutely or obtusely, sometimes acute, 1-85th by 1-2400th inch in its greatest dimensions (fig. 2); 2, flesh-spicule, minute, filiform or vermiculate, consisting of an open spiral coil of one turn and half, smooth (that is, without spines), 1-1714th inch long (fig. 3); 3, flesh-spicule, bacillar, consisting of a short, thick, cylindrical, straight shaft, with rounded ends and narrow, linear, central inflation (fig. 4). The skeleton-spicules mixed with a few flesh-spicules of both forms are confined to the interior, while the white incrustation is exclusively formed of the flesh-spicules. Size of largest specimen $4 \times 3 \times 1\frac{1}{4}$ inches; stem about 1 inch long and $\frac{3}{4}$ inch thick.

Hab. Marine.

Loc. South Australia

Obs. Examined in the dry state. There are now two specimens of this sponge in the British Museum, one of which is extremely small and insignificant-looking, about $1\frac{1}{2}$ inch in diameter, and the other, that above described, which came from the late Dr. Bowerbank's collection. The former bears my running number 385, but no other, while the glue about its stem shows that it was once attached to a board, and therefore has been a very long time in the Museum; the latter, which was also without label, now bears my no. 695. The hard, dense structure of the stem, combined with the white incrustation over the honeycomb or reticulated stiff structure of the surface, are all as much characters of the Echinonemata as they are opposed to those of the Suberitida in the Holorhaphidota; while, if we regard the flesh-spicules as equivalent to the "echinating" spicules, it seems to me that a place for *Trachycladus* should be sought for in the family Ectyonida, among the groups now included under the provisional name of Pluriformia. The characters of the sponge above given, together with the flesh-spicules, are quite sufficient for recognizing the species. Especially characteristic are the spiral flesh-spicules of the incrustation, which, under the microscope, look like myriads of little worms broken into pieces. So far, however, as their spiral form goes, this occurs in a sponge of a very different kind, viz. *Suberites spinispirulifer*, to be described hereafter; but here it is not only much larger, but *spined* all over.

Amorphina stellifera, n. sp.
(Pl. XXIX. fig. 10, a, b.)

Massive, amorphous, lobate, pierced and suspended by the fine branches of the seaweed among which it has grown. Colour originally white, but subsequently rendered pink by the presence of a pink *Palmella*-like cell. Texture crumb-of-bread-like. Surface even, thickened by the accumulation of broken spicules and sand, probably from having been rolled about in the shore-waves. Pores in the sarcode tympanizing the intervals between the broken spicules, as well as between those which have not become broken. Vents in pit-like depressions of the surface. Internal structure consisting of areolar sarcode charged with the spicules of the species and traversed by the canals of the excretory system; of a light yellow colour. Spicules of two forms, viz. :—1, skeleton-, acerate, curved, smooth, sharp-pointed gradually, of various sizes, the largest averaging 1-35th by 1-1500th inch in its greatest diameters (Pl. XXIX. fig. 10, a); 2, flesh-spicule, very delicate, stelliform, composed of eight or more micro-

spined rays parting from the centre directly (that is, without inflation there), 1-1500th inch in diameter (fig. 10, *b*). Skeleton- and flesh-spicules scattered throughout the sponge generally, the latter rather sparsely. Size of largest specimen about $2 \times 1\frac{1}{4} \times \frac{3}{4}$ inch.

Hab. Marine, growing in the Laminarian zone.

Loc. South Australia.

Obs. Examined in the dried state. There are two specimens of this sponge now in the British Museum, almost exactly alike in every particular, viz. one labelled "69. 1. 22. 25, Van Diemen's Land," and the other from the late Dr. Bowerbank's collection without label, except that of "South Australia," on the box in which it was contained, both now bearing my no. 315 E, *h*, 19. But for the presence of the little, delicate, stellate flesh-spicule, there would be no distinguishing *Amorphina stellifera* from the worldwide *Halichondria panicea*, Johnst., perhaps the commonest sponge on the coasts of Great Britain. It is remarkable, too, that the pink colour should be owing to the presence of the little parasitic cell mentioned, apparently identical with that of *Palmella spongiarum*, Cart. (Ann. 1878, vol. ii. p. 165), which I found to be the origin of a similar colour in a specimen of *Halichondria panicea* picked up on this beach (Buddleigh-Salterton).

Besides the pink cell in *Amorphina stellifera*, both specimens are charged with one which I think it advisable to note for future reference, as I do not know what it is. This cell, which is much larger than that of the *Palmella*, is colourless and ovoid, measuring 1-875th inch in its greatest diameter, containing a transparent nucleus 1-2000th inch in diameter, and surrounded by a number of still smaller cells, each of which is 1-6000th inch in diameter, the transparent spherical nucleus in the centre contrasting with the translucent ones that surround it.

As these specimens of *Amorphina stellifera* have grown from an embryo attached to the seaweed, the branches of the latter have become enveloped by them respectively during growth, like bits of grass &c. in a Fungus, and thus they have become suspended.

Suberites spinispirulifer, n. sp.
(Pl. XXVIII. figs. 6, 7.)

Specimens solid, elliptical, probably having obtained this form by forced separation from the place of growth and subsequent rolling about on the beach in the midst of the waves. Colour now chiefly yellowish white, with patches of purple on the surface, indicating that this, if not the whole of the sponge,

was once so tinted. Texture loose, open, crumb-of-bread-like. Surface without cortex, corrugated. Pores not visible. Vents numerous among the corrugations. Internal structure consisting of light, loose, areolated, flaky sarcode charged with the spicules of the species and traversed by the excretory canals. Spicules of two kinds, viz.:—1, skeleton-, stout, pin-like, curved, smooth, and sharp-pointed; pin-like head chiefly produced by a circular inflation of the shaft just inside the blunt end, 1-45th by 1-1542nd inch in its greatest diameters (Pl. XXVIII. fig. 6); 2, flesh-spicule, filiform, consisting of an open spiral coil of one turn and a half thickly spined (but *not* spirally) throughout; coil 1-1714th inch long by 1-3000th inch broad (fig. 7, *a*, *b*). Both mixed together in the body of the sponge, the latter most plentiful on the outer surface and on the surface of the excretory canals. Size of largest specimen about 2½ by 2 inches in its longest diameters.

Hab. Marine.

Loc. Port Elizabeth, Cape of Good Hope.

Obs. Examined in the dried state. There are several specimens of this sponge in the British Museum, all bearing the register no. 71. 5. 12. 1, with my running no. E 13, *h*, 15. A more magnified view of the spinispirulate flesh-spicule has been given in fig. 7, *b*, to show its elementary composition, and the specific designation taken from its peculiar spiral form, which, together with the presence of the *spines*, affords a combination that I have not met with in any other kind of sponge, the spiral flesh-spicule of *Trachycladus* being smooth (that is, without spines). It should be observed that the spines are not arranged spirally on the shaft.

Suberites angulospiculatus, n. sp.

(Pl. XXVIII. fig. 8, *a*, *b*.)

Plano-convex, cake-shaped, elliptical, depressed, spreading, sessile. Colour dark brown. Texture fine, compact, cork-like. Surface uniformly dimpled, irregularly undulating, without cortex. Pores and vents not evident. Internal structure compact, cork-like, consisting of fine areolar sarcode charged with the spicules of the species and traversed by the excretory canals, which are small; colour internally tawny yellow. Spicules of one kind only (no flesh-spicule), viz. acerate, undulating, smooth, straight, sharp-pointed, gradually angulated in the centre (Pl. XXVIII. fig. 8, *a*), or larger and less angulated (fig. 8, *b*), the former 1-246th by 1-12000th, and the latter 1-25th by 1-1200th of an inch in their greatest

diameters respectively. Size of specimen $4\frac{1}{2}$ inches in its longest horizontal diameter by $\frac{1}{2}$ inch high.

Hab. Marine, growing on hard bodies.

Loc. Jamaica.

Obs. Examined in the dried state. The dark-brown colour of the surface appears to arise from the tendency of the sarcode superficially to a glutinous consistence. Internally it is precisely like that of *Halichondria suberea*, Johnst., = *Suberites domuncula*, Sdt., and but for the form of the spicules, which can only be determined by microscopical examination, might be mistaken for it. There are three specimens of this sponge in the British Museum, all of which come from Jamaica, viz. :— that above described, which is registered 43. 2. 13. 53, with my running no. E 55, h, 14; another about the same size on the back of a crab, numbered 707, which came from Dr. Bowerbank's collection; and a third about the size of a small hazelnut, growing round the stem of a zoophyte, registered 50. 5. 8. 35; also a minute white parasitic patch of it on the surface of an undescribed species of *Reniera* with nodular surface, large conical crateriform lobes and sausage-shaped spicule, registered no. 40. 16. 12. 49, and no. 504 E, c, 7 (? from Madeira), in which the angulated spicule attains the "larger size" mentioned (viz. fig. 8, b), and abnormally is often accompanied by a third arm growing out from the middle of the shaft at right angles, so as to give the spicule a triradiate form.

Suberites fuliginosus, n. sp.
(Pl. XXVIII. fig. 9, a, b.)

Massive, spreading, botryoidal, lobular, corrugated, sessile. Colour soot-black. Tissue cork-like. Surface uniformly subbotryoidal. Pores not seen. Vents numerous, scattered over the botryoidal elevations, often grouped. Internal structure composed of a multilocular or cellular labyrinthic skeleton, densely charged with the spicules of the species; the labyrinthic cavities filled with black sarcode also charged with similar spicules, contrasting strongly in the section with the lighter colour of the skeleton. Spicules of two forms, both skeleton-, no flesh-spicule, viz. :—1, straight or slightly curved, fusiform, smooth, inflated and spined at each extremity, 1-857th by 1-4800th inch in its greatest diameters (Pl. XXVIII. fig. 9, a); 2, cylindrical or acuate, thicker and shorter than the foregoing, spined all over, 1-92nd by 1-1500th inch in its greatest diameters (fig. 9, b). Both mixed together throughout the sponge, but the latter very sparingly. Size of largest

specimen 4 inches in diameter horizontally; highest lobe $1\frac{3}{4}$ inch.

Hab. Marine.

Loc. ? Torres Straits.

Obs. Examined in the dried state. This is a very remarkable sponge, chiefly on account of its "soot-black" colour, but not less so in its spiculation. In structure and consistence it is almost identical with the type of my group *Cavernosa*, viz. *Rhaphyrus Griffithsii*, = to the free form of *Cliona celata*, and thus like *Spongia Dysoni*, Bk., from Belize (the largest sponge on record, of which the specimen is in the British Museum). While, however, *S. fuliginosus*, like *Rhaphyrus Griffithsii*, has no flesh-spicule, it nevertheless more nearly represents *Spongia Dysoni* (whose form of flesh-spicule is given in Plate XXIX. fig. 11) in the nodular surface and cribriform grouping of the vents over the nodules, if not in the colour also, which appears to have a slight tinge of purple, allying it to the lilac tint of the dried specimens of *Spongia Dysoni*. There are two pieces of *Suberites fuliginosus* in the British Museum, bearing the register no. 46. 8. 5. 8, with my running no. 379 E, h, 13. They were presented by the late J. B. Jukes, Esq., and, both being alike, probably form parts of one original mass.

Stellettinopsis corticata, n. gen. et sp.

(Pl. XXVIII. figs. 10-15.)

Globular, smooth, corticate, broadly sessile (Pl. XXVIII. fig. 10). Colour yellowish grey. Texture hard on the surface, soft internally. Surface smooth and even; cortex thin, hard when dry, fleshy when wet, about 1-48th inch thick, presenting a uniformly granular surface composed of minute convolutions of the dermal sarcode, like in form to those of the brain (but of course microscopic), charged with flesh-spicules of the species and grains of quartz sand (fig. 15, c, d, e). Pores in the grooves between the convolutions. Vents chiefly congregated about the summit of the sponge (fig. 10, a), twelve or more in number, of different sizes, the largest 1-6th inch in diameter, each partly closed by a thick, opaque, sphinctral diaphragm of sarcode in radiating folds surrounded by a raised margin (fig. 15, a, b). Internal structure cancellous in the section, subradiating from a more condensed centre, increasing in the size of its areolation towards the circumference, where it becomes continuous with the cortical layer; composed of areolar sarcode densely charged with the spicules of the species, altogether very like the interior of *Gredia* and *Stelletta*. Spicules of three kinds (viz. one skele-

ton- and two flesh-spicules), to which must be added the foreign material, viz. the quartz grains:—1, skeleton-spicule, acerate, long, smooth, curved, sharp-pointed gradually, 1-22nd by 1-1800th inch in its greatest dimensions (fig. 11); 2, flesh-spicule, stelliform, very minute and delicate, composed more or less of eight rays, radiating from the centre direct (that is, without inflation there), 1-2000th inch in diameter (fig. 12, *a, b*); 3, flesh-spicule, bacilliform, straight, cylindrical, obtuse at the ends, spined all over, about 1-666th by 1-6000th inch in its greatest dimensions (fig. 13, *a, b*); 4, quartz grains, variable in size, about the diameter of the flesh-spicules (fig. 14). No. 1 is confined to the interior, mixed with a few of the flesh-spicules; nos. 2 and 3, together with the quartz grains and a few fine acerates, are more abundant in the cortex. Size of specimen $1\frac{1}{8}$ inch high by $1\frac{1}{2}$ inch in transverse diameter about the middle, and 1 inch at the base.

Hab. Marine, on hard objects.

Loc. Port Adelaide, Australia (*Cuming*).

Obs. Examined in the dried state and after soaking in water. This specimen is in the British Museum, and bears the register no. 55. 3. 14. 8, with my running no. E, 301 *h*, 18. It has grown upon the outside of the flat valve of a large *Pecten*, where, at first, it looks very much like a specimen of *Hulichondria ficus*, Johnst. On examining it, however, more attentively and after soaking, it is found to have a fleshy cortex not unlike that of the Gumminida in consistence; in form and structure it is like *Geodia*, and its *internal* spiculation is like that of both *Geodia* and *Stelletta* so far as the *acerate* spicule goes; but there is *no trifid* spicule, and no zonular arrangement, of course, at the circumference. With all these characters it is impossible to assign it to either; and therefore a new genus has been made for it under the name of *Stellettinopsis*, after *Stelletta*, whose spiculation generally, minus the trifid forms, its spiculation so nearly resembles that at first sight there appears to be no difference. Its place should, perhaps, be in the order Holorhaphidota, among or after the Suberitida, and before the Pachytragida.

Stellettinopsis simplex, n. sp.

(Pl. XXVIII. figs. 16-18.)

Massive, convex, lobate, sessile. Colour tawny brown. Texture loose. Surface firm, even, irregularly undulating, without cortex. Pores not seen. Vents grouped in a depression on the lower aspect. Internal structure confused, consisting of open areolar sarcode, crumb-of-bread-like, charged with spicules of the species, and traversed by the excretory

canals. Spicules of three forms (viz. one skeleton- and two flesh-spicules):—1, skeleton-, large, acerate, curved, smooth, sharp-pointed gradually, 1-19th by 1-900th inch in its greatest dimensions (Pl. XXVIII. fig. 16); 2, flesh-spicule, stellate, very variable in form, from the variable number and irregular position of the rays, from two to twelve, arising from a slight central inflation—very variable also in size, from 1-1200th to 1-428th of an inch in diameter (fig. 17, *a, b*), rays microspined (fig. 17, *c*); 3, flesh-spicule very minute, sceptrelliform, consisting of a straight shaft, spined at intervals, viz. at the ends and at two points on the shaft, all equidistant, but very variable in this respect, 1-1500th inch long (fig. 18 *a*). Skeleton-spicules, with a few flesh-spicules, generally distributed throughout the mass; the latter most abundant on the surface. Size of specimen $2\frac{1}{2}$ inches long and 1 inch high.

Hab. Marine, on hard objects.

Loc. Freemantle, Australia.

Obs. Examined in the dried state. This specimen, now in the British Museum (numbered 691), came from the late Dr. Bowerbank's collection, and is labelled "Thomas Ingall," in addition to the locality. I also possess a mounted fragment, taken from a specimen from Hayti belonging to the Liverpool Free Museum, which was sent to me by Mr. Thomas H. Higgin for examination. In spiculation *S. simplex* is so much like *Stellettinopsis corticata* that I have placed it in the same genus, assuming that the sceptrelliform flesh-spicule is but another form of the entirely spined bacillar one of the latter; the large size of the acerate, however, renders it still more like that of the acerate body-spicule of *Stelletta*.

In the Haytian specimen (which is attached to the base of one of *Luffaria fistularis*) the spiculation, generally, is a little larger, the spination of the sceptrella more irregular than that of the Australian one, and the rays of the stellate slightly inflated elliptically at their free ends.

Samus anonyma, Gray. (Pl. XXIX. figs. 1-4.)

Minute amorphous masses of dry contracted sarcode, furnished with filiform extensions, and charged with spicules of the species, in cavities formed by an excavating *Cliona*. Colour now like that of dried sarcode, *i. e.* yellowish. Texture also that of dried sarcode, viz. gum-like. Pores, vents, and internal structure not visible, from the dried state and minuteness of the specimens. Spicules of three forms, viz.:—1, very large, consisting of a short, stout, smooth, subtriangular shaft, terminated at each end by a similar development,

viz. three divergent smooth arms, each ending in three smooth prongs, nearly on the same plane, one of which is central and in a line with the arm, and the other two lateral, viz. one on each side divergent, 1-150th to 1-90th inch long by 1-225th inch across the head (Pl. XXIX. figs. 1, 2), subject to great variation in size and form of the terminal elements in the same and different specimens; 2, small, consisting of a short shaft, similar in form to the last, with a similar development at one end, but with only three undivided arms at the other end (fig. 3, *b*), all except the shaft minutely spined and showing the central canal very plainly, 1-600th inch in diameter across the large head (figs. 3, 3 *a*); 3, flesh-spicule minute, bihamate (*fibula*), C- and S-shaped, microspined, 1-3000th inch in diameter (figs. 4, 4 *a*). No. 1 is the largest and staple form, no. 2 smaller and less plentiful, no. 3 very abundant. Size of specimen varying with the size of the excavation of the *Cliona*.

Hab. Marine, in cavities of old stony coral excavated by a *Cliona*.

Loc. West Indies and Australia, in *Millepora alcicornis*; and in old *Stylaster sanguineus*, South Seas.

Obs. Examined in the dried state. Wherever I have found this sponge it has been in the said excavations *in company* with *Cliona mucronata*, Sollas ('Annals,' 1878, vol. i. p. 54), *but separate*. Hence, as *Cliona* is the only excavating sponge with which I am acquainted, I conclude that *Samus anonyma* is not a *Cliona*. The filaments that are appended to the little masses of dried sarcode appear to be portions of the latter, which originally occupied the finer passages of the *Cliona*, drawn out by the contraction of the mass now occupying the excavated chamber. The specimen from Australia, to which I have alluded, was in the late Dr. Bowerbank's collection now in the British Museum; it bears my running no. 699, and came from a box of specimens labelled by Dr. Bowerbank "From Mr. Ingall, Australia."

Heretofore I have found a spiculation like that of *Dercitus niger*, Cart., = *Battersbya Bucklandi*, Bk., in the cavities of *Cliona mucronata*, as indicated by the presence of the latter with it, in old coral from the island of Cuba; and having often observed this *black* sponge (*D. niger*) here, at Budleigh-Salterton, growing into the minute crevices of the red rock, it seems, from its gummy sarcode and confused spiculation, to be not only allied to *Samus*, but to the Gumminida also. No. 2 spicule (Pl. XXIX. fig. 3) is very like that of a *Corticium* ('Annals,' ser. 4, vol. xii. p. 19, pl. i. fig. 5, &c.). But, be this as it may, the "large spicule" was first figured by

Dr. Bowerbank (Mon. Brit. Spong. vol. i. p. 234, pl. ii. figs. 41, 42), who merely states that the sponge producing it was found lining the tortuous tube of an Annelid in soft limestone (? *Millepora alcicornis*), like *Hymeniacion celata*, Bk. (1866), = *Cliona celata*, Grant (1826), and *Vioa*, Nardo (1839); it should be remembered that Dr. Bowerbank considered the excavations of *Cliona* to have been formed by an Annelid (Mon. Brit. Sp. vol. ii. p. 220),—after which Dr. Gray proposed the generic name "*Samus*" for the kind of sponges producing this spicule, and *S. anonyma* for the species (Proc. Zool. Soc. 1867, p. 526). My dear old friend was wrong, however, in allying it to *Axos Cliftoni* or to any of Duchassaing's species of *Vioa*, if the inference of the nature of *Samus* above given be correct.

This brings us to the question whether Hancock, in his first excellent paper on the Excavating-powers of *Cliona* &c. ('Annals,' 1849, vol. iii. p. 321), has not based his genus "*Thoosa*" (ib. p. 345) upon spicules belonging to a *Samus*, seeing that those represented by him (ib. pl. xii. figs. 10, *b*, and 11, *a, b*) are essentially like the spicules of *Dercitus* and *Samus* respectively, while there is a total absence of the *pin-like* spicule, which appears to me to be invariably the form of the skeleton-spicule of the Clionidæ.

Further corroboration of this view seems to be derived from the fact that, in the mountings of the minute detritus of the root-bunch of *Euplectella cucumer* from the Seychelles, which present an innumerable variety of sponge-spicules, the large ones of *Samus anonyma* are present, together with a still more complicated and beautiful form, and a flesh-spicule (Pl. XXIX. fig. 21) almost identical with that which is figured by Hancock as characteristic of both species of his genus "*Thoosa*" (pl. xii. fig. 10, *a*, and pl. xiii. fig. 2, *b*); while of the spicule referred to *Thoosa cactodes*, to which I have before alluded (viz. pl. xii. figs. 11 *a* and 11 *b*), Hancock has stated (p. 347) that he was not able to determine whether or not it belonged to the species, although he felt inclined to the affirmative.

It might be urged against my view that the representation of *Thoosa cactodes* (pl. xiii. fig. 1) is evidently that of a *Cliona*. But then, as *Samus anonyma* fills the cavities of *Cliona*, it, of course, would present the same shape; while the absence of the pin-like spicule here, and the presence of *Samus* together with *Cliona mucronata* in the instances that have been mentioned, show that both may be in the same excavation, and, from the inference that the excavation was made by the latter, that *Samus* is not a *Cliona*.

Corticium Wallichii, Cart. (1874).

(Pl. XXIX. figs. 5-9.)

Minute, amorphous, laminiform. Colour that of dried sarcode, *i. e.* yellowish. Texture like dried sarcode—that is, gum-like. Pores, vents, and internal structure not visible, from the minuteness and dryness of the specimens. Spicules of two kinds, viz. :—1, skeleton-, large, acerate, curved, tubercled throughout in twelve longitudinal lines (Pl. XXIX. fig. 5); tubercles alternate in adjoining rows, constricted in the centre, expanded at the free ends, the latter circular and convex (fig. 5, *aaa*), extended over the extremities of the spicule so as to give them an obtuse irregular form. Central canal bent angularly in the middle towards the convexity of the spicule, undulating afterwards towards the extremities (fig. 5, *b*), 1-31st by 1-200th inch in its greatest diameters, including the tubercles—or the same spicule in an earlier stage of development, without tubercles, and with an angular projection in the centre of the convexity (fig. 6), opposite the bend in the central canal (fig. 6, *a*); 2, flesh-spicule, sceptrelliform (fig. 7), consisting of a straight shaft, abruptly pointed at each end, and microspined throughout, except in the middle (fig. 8, *a*), provided with two circles of horizontal rays, separate from each other, and a little nearer one end of the shaft than the other (fig. 8, *bb*), rays eight or less in number, straight, smooth, capitate, each terminated by a globular inflation, shaft 1-1000th inch long, circle of rays 1-3000th inch in diameter (fig. 9, *a, bb*). Skeleton-spicule in different degrees of development, mixed together with the flesh-spicule in the sarcode. Size that of the excavated cavity in the piece of *Stylaster* where it was found, viz. about 1-18th inch in diameter.

Hab. Marine, in the cavities of ? *Cliona mucronata* in dead old *Stylaster sanguineus* (coral).

Loc. South seas.

Obs. Examined in the dried state. In 1864 Dr. Bowerbank (Mon. Brit. Sp. vol. i. p. 270, pl. xi. fig. 244) gave a figure of the skeleton-spicule of this sponge that had been frequently found in the washings of *Oculina rosea* = *Stylaster sanguineus*, from the South Seas, noting that the sponge itself from which it came had “never been determined.” In 1871 Dr. G. C. Wallich kindly sent me some of his “dredgings” on the Agulhas Shoal, Cape of Good Hope, made in 1857; and among these I found and mounted a spicule of this kind, from which the description and figure were taken (‘Annals,’ 1874, vol. xiv. p. 252, pl. xv. fig. 46), when I proposed for the

sponge producing it the name of *Corticium Wallichii*, conjecturing that, hereafter, the latter might be found to belong to the Gumminida. (Here I may observe that the characters of the Gumminida are not absolutely like gum, but like gum or glue only when dry, and when wet flexible and insoluble like india rubber.) Subsequently, in going through the late Dr. Bowerbank's collections for the British Museum, I found a piece of *Stylaster*, and examining it, under the microscope, by chance met with a small excavation in the dead or older part, lined with the specimen of *Corticium Wallichii* above described, also a few of its characteristic spicules in another part. Finally I found one of the fully developed skeleton-spicules in some of the minute detritus which came from the root-bunch of the specimen of *Euplectella cucumer* from the Seychelles. Hence *Corticium Wallichii* may be fairly inferred to exist at least in three distinct localities, viz. the South Sea, the Cape of Good Hope, and the Seychelles.

Owing to the smooth acerate form of the earlier stages of development of the skeleton-spicule, it is almost impossible to detect the presence of this sponge unless the fully matured tubercled spicule or peculiarly shaped flesh-spicule is witnessed.

Occurring, too, in the midst of the excavations of *Cliona mucronata*, like *Samus anonymus*, it is difficult to decide whether, like the latter, it be a follower of the former, or its own excavator, because, as yet, the presence of *Cliona mucronata* in the same excavation has not been observed. Again, *Corticium Wallichii* has hitherto been found to line the excavation, instead of being contracted into the centre of it like the specimens of *Samus anonymus*. But both these circumstances may be accidental; and therefore nothing but a further observation of *Corticium Wallichii* can determine its real nature. The creeping into small cavities is rather a habit of the Spongida generally than of any particular species.

Proposed Names for two new Groups of Flesh-spicules in the Spongida, viz. SPINISPIRULA and SCEPTRELLA.

In my "Notes Introductory to the Study and Classification of the Spongida" (Ann. 1875, vol. xvi.), at pp. 30-34 I have given a short account of the "flesh-spicule," with illustrations of a few of the commonest types, to which I now propose to add two more under the names respectively of "*Spinispirula*" and "*Sceptrella*," as a more extended knowledge of the Spongida shows this to be desirable, if not necessary.

Varieties of both these types are represented, in Dr. Bowerbank's 'Monograph of the British Spongiadæ,' as "defensive spicula"—the former under the designation of "spinulo-multiangulated cylindrical" (vol. i. p. 239, pl. iii. fig. 72), and the latter under that of "vertically-spined cylindrical" (ib., ib. fig. 69).

Each type, like those already mentioned in my "Notes, &c.," presents itself under a great variety of forms; and although it is necessary to remember these forms in connexion with the species to which they belong, yet it is equally necessary that the respective typical ones upon which each group is constructed should be first understood.

The SPINISPIRULA.

Spinispirula, as its etymology indicates, is a spiniferous, spirally twisted spicule (*ex. gr.* Pl. XXVI. fig. 14, *a*, and Pl. XXIX. fig. 11), which may be long or short, thick or thin; thus in *Rhaphidhastia spectabilis* (Pl. XXVI. fig. 14, *a*) it is long and thin; while in the Suberite from the crab's back to be hereafter mentioned (Pl. XXIX. fig. 12) it is short and thick. Again, the spines may be long and thin, as in *Dactylocalyx Masoni*, Bk. (Proc. Zool. Soc. 1869, pl. vi. fig. 4); or long and thick, as in *D. Bowerbankii*, Johnston (ib. fig. 8, *b*), or obtuse (ib. fig. 8, *a*). The spines may be arranged on the spicule in a spiral line, corresponding with that of the shaft, as in *Rhaphidhastia spectabilis* and *Spongia Dysoni*, Bk. (*l. c.*), or they may be scattered over the shaft less regularly,—in all cases over the extremities, and sometimes entailing an elongation of the surface of the shaft (Pl. XXIX. fig. 11). Lastly, the shaft may consist of many or be reduced to one spiral bend only, as in *Rhaphidhastia spectabilis* and *Hymenaphia spiniglobata* (Pl. XXIX. figs. 14, *a*, and 16, *d*) respectively, when the latter may pass into a globular form, hence Schmidt's name "Spiralstern" (Spong. Küste Algier, p. 17).

To convey an idea of the plan upon which the *Spinispirula* and its varieties are formed, let us conceive a thin globe of india rubber over which a number of spines are arranged in a spiral or less regular manner, the spiral line having its poles opposite each other; now let the globe be more or less elongated in the direction of its axis, and at the same time twisted, when it will be possible to represent thereby most of the varieties of the *Spinispirula*. In many instances, the transparency of the spicule allowing all its spines to be more or less seen at once, it will be necessary to study their arrangement carefully by altering the focus of the magnifying-power, when the

optical delusion will be discovered and the spiral arrangement in most instances satisfactorily recognized.

I have already noticed the *smooth* form of this spirula under the name of "sinuous subspiral" ("Notes," &c. p. 32), which is well seen in *Cliona abyssorum* (Ann. 1874, vol. xiv. p. 249, pl. xiv. fig. 33).

As regards the extent to which the *Spinispirula* under various forms occurs among the Spongida, I have as yet not seen it in any of the orders but that of Holorhaphidota—and here confined to the families Suberitida, Pachytragida, and Pachastrellida, where it is very common among the groups Cavernosa, Compacta, and Laxa, and also in *Placospongia melobesioides*, which may have to come into the same family; rarer in the Pachytragida, where its great abundance, though, and almost peculiar form, in *Tethea muricata*, Bk. (= *Wyvillethomsonia Wallichii*, Wright), becomes a character, as first shown by the late Dr. Bowerbank (Phil. Trans. 1862, pl. xxxi. figs. 14, 15)—used again by him as an illustration of this kind of spicule, described and represented under the designation of "elongo-attenuato-stellate" (Mon. Brit. Sp. vol. i. p. 233, pl. i. fig. 35); also abundant, but in a minuter form, in *Stelletta aspera* (Ann. 1871, vol. vii. p. 7, badly illustrated). Minute, although constant and varied in form, in the Pachastrellina, and present also in some of the Corallistes, *ex gr. Dactylocalyx Masoni*, Bk. (*l. c.*).

As the C-shaped bihamate flesh-spicule or *fibula* is contortly subspiral, and not simply bent upon itself, which may be seen by viewing it on a flat surface, while the S-shaped form is still more spiral, the latter when spined throughout, as in some species of *Tethyina* (Ann. 1876, vol. xviii. pl. xvi. fig. 49), literally becomes a *spined spire*; but for memory's sake the line of distinction must be drawn somewhere, and therefore this had better be still considered as a variety of the bihamate rather than one of *Spinispirula*; so should the spiniferous coil or open spire, represented by the flesh-spicule of *Suberites spinispirulifer* (Pl. XXVIII. fig. 7), whose spines cover the spiral shaft uniformly—that is, without any *spiral* arrangement.

In noticing the transition of the stellate to the spinispirula in *Vioa Johnstonii*, Schmidt (Spongien d. atlant. Gebietes, p. 5) alludes to his *Spirastrella cunctatrix* and *Chondrilla phyllodes*. The former was "violet or reddish," and the latter "violet-brown" in colour, together with identical spiculation; but, from the spinispirula (flesh-spicule) in the latter being a little shorter and its consistence gelatinous, especially in

the cortex, *Chondrilla phyllodes* seems to have been placed among the Gumminida, and *Spirastrella cunctatrix*, on account of its crust, among Schmidt's Corticatæ (Spongien von Algier, p. 17).

Now precisely the same species in point of spiculation occur at the Mauritius and on the south coast of Australia, as I learn from specimens in the late Dr. Bowerbank's collection and that of the Liverpool Free Museum respectively. In all there is the usual condensed layer of flesh-spicules on the surface; and all present the fine crumb-of-bread-like consistence (areolated sarcode) observed in *Halichondria suberea*, Johnst., = *Suberites domuncula*, Nardo. But while the former possess spinispirulate flesh-spicules like those of *Spirastrella cunctatrix*, represented by Schmidt (Spongien, 1. Suppl. Taf. iv. fig. 12, and Spong. von Algier, Taf. iii. fig. 8), that of the specimen in the Liverpool Museum, which has grown on the back of a little crab, is, together with the skeleton-spicule, a little shorter and stouter (Pl. XXIX. fig. 12). Indeed there is much the same difference between the two as there is between Schmidt's illustrations of the flesh-spicule of *Spirastrella cunctatrix* and *Chondrilla phyllodes* respectively, all having the same pin-like skeleton-spicule.

Hence it becomes questionable, with such varietal differences *only* in the spiculation, whether the difference in consistence may not be local, viz. gelatinous in *Chondrilla phyllodes* from the Antilles, and crumb-of-bread-like in the Suberite on the crab's back from the Mauritius.

There were five of these little crabs from the Mauritius sent for examination, each of which was about half an inch in diameter, and each overgrown by a different organism. Thus they bore respectively *Halichondria incrustans*, *Isodictya*, the white Suberite mentioned, *Chondrilla nucula*, *Chondrosia*, sp., and a calcareous white compound tunicated animal; so that I had ample means of contrasting the friable consistence of the Suberite with the gelatinous one of the Gumminida; while the spiculation of the former only differing from the other Suberites in the way above mentioned, led me to regard the whole as specimens of Schmidt's *Spirastrella cunctatrix*, one of which, viz. that from Australia (Freemantle), now numbered "708," measures 6 × 4 × 2 inches in its greatest dimensions. Both this and those from the Mauritius, although dry, still present the remains of the violet-red colour which they had when fresh, together with some great variety in the length, size, and general form of the flesh-spicule; while that on the crab's back is white and the spiculation more robust.

THE SCEPTRELLA.

Sceptrella, meaning a little sceptre, differs from *Spinispirula* in having a cylindrical, straight shaft with its spinal developments arranged in groups circularly about the ends, and at more or less equal distances on the shaft. The spines may be smooth and simple, as in *Podospongia Loveni*, Bocage (Journ. d. Sci. Math., Phys. et Naturelles, no. iv. Lisbonne, 1869, pl. x. fig. 1, &c.), or microspined, as in *Sceptrella regalis*, Sdt. (Spongien d. atlant. Gebietes, p. 58, Taf. v. fig. 24, a); or the groups on the shaft may be transformed into circular plates with serrated margin, as in *Latruncula cratera*, Bocage (*op. et loc. cit.*, pl. xi. fig. 2, c, d, e); for illustrations of these respectively see Pl. XXIX. figs. 13, 14, and 15; or the plates round the shaft may be cup-shaped (figs. 16, 17, and 18), or the shaft stout with few and large spines (fig. 19), or the circular plates inflated on the margin and, together with most of the shaft, uniformly covered with minute spines (fig. 20); or, finally, the shaft may be almost obscured by the groups at the extremities being transformed into a single globular inflation, and those on the shaft into four or more such globular inflations, all microspined (fig. 21); the latter is almost a fac-simile of one of the spicules characterizing Hancock's genus *Thoosa* among the excavating sponges, to which I have already alluded. All the illustrations of the sceptrella are drawn on the same scale for comparison; and figs. 16 to 21 inclusive are present in greater or less number among my mounted specimens of the minute detritus from the root-bunch of *Euplectella cucumer*, obtained at the Seychelles, in which the number of known and unknown forms of spicules of the Spongida is truly wonderful, to say nothing of the other siliceous organisms, viz. the Radiolaria and Diatomaceæ, all of which, having been boiled in nitric acid, are preserved (at the expense, of course, of the calcareous Foraminifera), mixed up with gold dust and blue sapphire, &c.

As regards the extent to which the sceptrella under various forms occurs in the Spongida, I have never seen it in any species but those which I should be inclined to place among the Suberitida in the order Holorhaphidota, viz. those above mentioned, i. e. *Axos spinipoculum*, *Stellettinopsis simplex*, and perhaps *Corticium Wallichii*, together with the sponges from which the sceptrellæ in the mounted detritus from the root-bunch of *Euplectella cucumer* came, a few only of the forms of which have been briefly described and added to the illustrations of this beautiful flesh-spicule.

Schmidt's *Sceptrella regalis* seems to me to be an anomaly, since there are anchorates of both kinds present, viz. equi- and inequianchorates. May not these be adventitious?—just as we find the skeleton- and smooth spirular spicule of, to me, Hancock's *Cliona northumbrica* (Ann. 1867, vol. xix. p. 237, pl. vii. fig. 1) mixed with or appropriated by an *Esperia*, forming part of Kent's *Rhaphidotheca Marshall-Hallii* (Ann. 1870, vol. vi. p. 222, pl. xv. figs. 3 and 6).

It remains to be seen whether *Corticium Wallichii*, which I conjectured, from the form of the skeleton-spicule only, to belong to the Gumminida, does so or not.

That *Sceptrella* may be a *Spinispirula* under another form, the flesh-spicules of *Latruncula corticata* (Pl. XXVII. fig. 4, *a*, *b*, *c*) plainly demonstrate.

EXPLANATION OF PLATES.

PLATE XXVIII.

- Fig. 1.* *Trachycladus lævispirulifer*, n. sp. (natural size). *a*, stem; *b*, branches.
- Fig. 2.* The same. Skeleton-spicule (scale 1-24th to 1-6000th inch).
- Fig. 3.* The same. Flesh-spicule, spirular (same scale).
- Fig. 4.* The same. Flesh-spicule, cylindrical (same scale).
- Fig. 5.* The same. Length of spicule on scale of 1-12th to 1-1800th inch, for comparison.
- Fig. 6.* *Suberites spinispirulifer*, n. sp. Skeleton-spicule (scale 1-12th to 1-1800th inch).
- Fig. 7.* The same. Flesh-spicule, spinispirulate. *a*, same scale; *b*, more magnified, to show the spination.
- Fig. 8.* *Suberites angdospiculatus*, n. sp. *a*, smaller and more angulated form; *b*, larger and less angulated form. Scale 1-24th to 1-6000th inch.
- Fig. 9.* *Suberites fuliginosus*, n. sp. *a*, smooth skeleton-spicule; *b*, spinous skeleton-spicule. Scale 1-24th to 1-6000th inch.
- Fig. 10.* *Stellettinopsis corticata*, nov. gen. et sp. (nat. size). *a*, vents; *b*, base.
- Fig. 11.* The same. Skeleton-spicule (scale 1-24th to 1-1800th inch).
- Fig. 12.* The same. Flesh-spicule, stellate. *a*, on scale of 1-48th to 1-6000th inch; *b*, the same, more magnified.
- Fig. 13.* The same. Flesh-spicule, bacilliform, spinous. *a*, on scale of 1-48th to 1-6000th inch; *b*, the same, more magnified.
- Fig. 14.* The same. Quartz grains in the cortex.
- Fig. 15.* The same. Vent and portion of the surface, magnified respectively and relatively, to show:—*a*, aperture in the centre of the sphinctral diaphragm; *b*, elevated border; *c*, form of the convoluted dermal sarcode; *d*, the same, more magnified, showing the position of *c*, the quartz grains.
- Fig. 16.* *Stellettinopsis simplex*, n. sp. Skeleton-spicule (scale 1-24th to 1-1800th inch).
- Fig. 17.* The same. *a*, flesh-spicule, stellate (scale 1-48th to 1-6000th inch); *b*, the same, more magnified; *c*, arm, still more magnified, to show the microspination.
- Fig. 18.* The same. *a*, flesh-spicule, sceptrella; *b*, the same, more magnified. Scale 1-24th to 1-6000th inch.

PLATE XXIX.

- Fig. 1.* *Samus anonymus*, Gray. Skeleton-spicule; end view (scale 1-12th to 1-1800 inch).
- Fig. 2.* The same. Skeleton-spicule; lateral view (same scale).
- Fig. 3.* The same. Flesh-spicule, (large) spined; end view (same scale). *a*, more magnified, to show the spined surface as indicated by the serrated margin; *b*, end of shaft, with smaller and unbranched arms.
- Fig. 4.* The same. Flesh-spicules (small), bihamate (*fibula*). Scale 1-12th to 1-1800th inch. *a*, one more magnified, to show the microspination.
- Fig. 5.* *Corticium Wallichii*, Cart. (1874). Skeleton-spicule (scale 1-6th to 1-1800th inch). *a a a*, tubercles; *b*, central canal.
- Fig. 6.* The same. Skeleton-spicule without tubercles, early stage of development. *a*, central canal. Same scale.
- Fig. 7.* The same. Flesh-spicule, sceptrellate (same scale).
- Fig. 8.* The same. Flesh-spicule, more magnified (scale 1-6th to 1-6000th inch). Lateral view. *a*, shaft; *b b*, radiated disks.
- Fig. 9.* The same. Flesh-spicule, radiated disks of; end view. *a*, shaft; *b*, capitate radii.
- Fig. 10.* *Amorphina stellifera*, n. sp. *a*, skeleton-spicule; *b*, flesh-spicule, stellate. Scale 1-24th to 1-1800th inch.
- Fig. 11.* *Spinispirula*. Flesh-spicule of *Spongia Dysoni*, Bk., much magnified (scale 1-4th to 1-6000th inch).
- Fig. 12.* The same. Flesh-spicule from *Spirastrella cunctatrix*, Sdt., mihi, from the variety on the crab's back (scale 1-12th to 6000th inch).
- Fig. 13.* *Sceptrella*. Flesh-spicule of *Spongia Loreni*, Bocage.
- Fig. 14.* The same. Flesh-spicule of *Latruncula cratera*, Bocage.
- Fig. 15.* The same. Flesh-spicule of *Sceptrella regalis*, Sdt.
- Figs. 16-21.* The same. Various forms from the minute detritus of deciduous sponge-spicules in the root-bunch of *Euplectella cucumer* from the Seychelles. *Fig. 16.* End view of one, so situated in the detritus.
- N.B. All the figures from 16 to 21 respectively are drawn to the same scale, for comparison, viz. 1-12th to 1-6000th inch.

XXXIX.—*An Account of a small Series of Coleoptera from the Island of Johanna.* By CHARLES O. WATERHOUSE.

A SMALL series of Coleoptera has recently been added to the British-Museum collection from the island of Johanna. The specimens were collected by Mr. Bewsher; and among them I have detected three species new to science, for one of which I propose to establish a new genus. The following species were obtained:—

1. *Cicindela melancholica*, Fabr.

Three examples of this widely distributed species.